

REMARKS

This amendment is responsive to the Office Action of April 4, 2006. Reconsideration and allowance of claims 2-5, 8, 10, 11, and 13-21 are requested.

The Office Action

Claims 1-12 stand rejected under 35 U.S.C. § 102 as being anticipated by Foxall (US 6,492,811).

The Reference of Record

Foxall is directed to a fluoroscopy or ciné method in which odd echoes and even echoes are reconstructed separately into two images which are temporally displaced from each other by one half of the repeat period ($TR/2$). These images are then displayed sequentially followed by the images of following repetitions to create a fluoroscopy display or are recorded and redisplayed as a ciné display. Foxall makes no suggestion of combining these two images. Indeed, because the two images represent different points in time of a moving organ, it is submitted that there is no motivation to combine these images.

As shown in Figure 2A, the data is read during a series of read gradients G_R . Between each read gradient or data acquisition, a phase-encode pulse G_θ is applied to step from one line of k-space to the next. There are no compensation pulses, z-shimming pulses, or z-pulses of any type in the embodiment of Figure 2A. The only place where Foxall suggests the potential uses of z-gradient pulses is in an un-illustrated alternate embodiment described at column 7, lines 52-59, which are directed to a 3D imaging technique. That is, +kz pulses and -kz pulses are applied alternately to shift the data acquisition between two different slices. The even echoes generate an image of one slice and the odd echoes generate an image of a different slice. Again, there is no suggestion of combining these two images which represent different physical locations of the subject, nor does Foxall provide any motivation which would motivate the reader to combine images which depict two different regions of the subject.

**The Claims Distinguish Patentably
Over the References of Record**

Claim 2 calls for a first compensation pulse applied after sampling in the first direction and a second compensation pulse to be applied after sampling in the second direction. Foxall does not apply such compensation pulses. In Figure 2A, Foxall applies phase-encode pulses to increment the k-space or line along k-space. Such position incrementing pulses are in addition to the compensation pulses. Thus, Foxall does not disclose applying first and second compensation pulses.

Further, claim 2 calls for generating two images, each with different characteristics. By contrast, Foxall generates two images with substantially the same characteristics but displaced in time, or in one alternate embodiment, with substantially the same characteristics displaced in space.

Further, claim 2 calls for combining these two images with different characteristics into one image. Foxall does not suggest combining the temporally or spatially offset images into a single image nor does Foxall provide any motivation or suggestion why one should combine temporally offset images or spatially offset images. Indeed, combining the temporally offset images of Foxall would lose the sought after advantage of generating a plurality of images in each repetition, but with different offsets for faster and smoother fluoroscopy and ciné applications.

Claim 3 calls for the compensation pulses to be z-shimming pulses. The embodiment of Figure 2A of Foxall does not use z-pulses of any type. The alternate embodiment of column 7, lines 52-59 applies spatial position selecting z-pulses for 3D imaging. Thus, Foxall does not teach or fairly suggest the application of z-shimming pulses.

Claim 14 calls for the application of SENSE or SMASH methodology. Such methodology is not disclosed by Foxall.

Claim 15 calls for the second compensation pulse to be a rewind pulse. The phase-encode pulses of Figure 2A of Foxall all have the same polarity and are not compensation pulses, but pulses for incrementing position in k-space.

Accordingly, it is submitted that **claim 2 and claims 3-5, 8, and 13-16 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 10 calls for applying a z-shimming pulse after each sampling step. The embodiment of Figure 2A of Foxall does not disclose applying z-pulses after each sampling. The embodiment of column 7, lines 52-59 applies a z-spatial encoding pulse, but does not suggest a z-shimming pulse.

Claim 10 further calls for a means for combining the two images into a hybrid image. Foxall neither discloses nor provides any motivation to combine the generated temporally or spatially offset images. Accordingly, it is submitted that **claim 10 and claims 17-18 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 11 calls for reconstructing first and second images of a selected physical region and combining those images into a third image of the selected region. Foxall makes no suggestion of combining the two generated images. Accordingly, it is submitted that **claim 11 and claims 19-21 dependent therefrom** distinguish patentably and unobviously over the references of record.

Substitute Drawings

As requested by the Examiner, the applicants are enclosing substitute sheets of drawings containing Figures 1 and 2 labeled "prior art". The applicants also include a substitute sheet containing Figure 3, but with the blocks labeled.

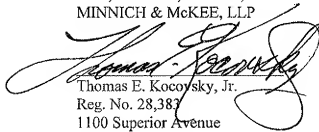
CONCLUSION

For the reasons set forth above, it is submitted that claims 2-5, 8, 10, 11, and 13-21 distinguish patentably over the references of record and meet all statutory requirements. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, she is requested to telephone Thomas Kocovsky at (216) 861-5582.

Respectfully submitted,

FAY, SHARPE, FAGAN,
MINNICH & MCKEE, LLP

A large, stylized handwritten signature in black ink, which appears to read "Thomas E. Kocovsky, Jr.", is written over the printed name and address.

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